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**SPECIFICATION FOR TERRE KLEEN™
URBAN PROTECTOR
US Patent No. US 6,676,832 B2
BY**

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PART 1-GENERAL

1.1 DESCRIPTION

- A.** This work shall consist of manufacturing, delivering to the job site and installing a **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)**; a hydrodynamic separator, at each location as shown on the contract plans. The unit shall treat all stormwater without loss of floatable matter, such as trash, debris, litter and oil and grease captured in the oil booms; there shall not be significant scour of settled sediment from the sediment storage area in the grit chamber. External by-pass structures are not allowed. Each unit has a primary chamber and grit chamber. The primary chamber separates oil, grease and floatable debris contained in a fully baffled area to prevent loss or re-suspension of captured oil, grease, and floatable trash and debris including captured sediment. The primary chamber is followed by a grit chamber into which the stormwater flows after passing through a nutrient screen in the divider wall between the two chambers. This product is produced by Terre Hill Concrete Products under the name "Terre Kleen™". All rights are reserved.(US Patent No. 6,676,832 B2)
- B.** The **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** hydrodynamic separator shall operate based on the hydrostatic pressure differential between the inlet and outlet pipe. The design of the device shall prevent loss of captured pollutants including oil, grease, trash, debris, and sediment through scouring or other causes during all flows and conditions. The nutrient screen shall be positioned to allow passage of all flows without allowing loss of captured pollutants.
- C.** Both the primary and the grit chambers shall be accessible through removable covers at grade for the removal of floatable material, water and the settled solids and floating particulates using a standard vacuum truck. No confined space entry shall be required for removal of captured pollutants.
- D.** Captured sediment storage shall be not less than 0.5 Ft³/Ft² of settling area in the Terre Kleen.
- E.** Oil Storage shall be not less than 1.0 gallons/Ft² in the in the **Terre Kleen™ (US Patent No. US 6,676,832 B2)**

1.2 SUBMITTALS

- A. Shop drawings shall be submitted as described in Division 1 – General Requirements.
- B. Certifications by a Professional Engineer licensed in the state of installation shall be submitted that the **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** hydrodynamic separator structure conforms to the standards listed in this Specification.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - A-48 Specification for Gray Iron Castings
 - C-32 Specification for Sewer and Manhole Brick
 - C-270 Specification for Mortar for Unit Masonry
 - C-478 Specification for Precast Reinforced Concrete Manhole Sections
 - C-913 Standard Specification for Precast Concrete Water and Wastewater StructuresUS Patent No. US 6676832 B2; Surface water purifying catch basin.
- B. Federal Specifications (FS):
 - FS-SS-S-210 Sealing Compound, Preformed Plastic for Expansion Joints and Pipe Joints

1.4 MANUFACTURERS

- A. The products furnished by named manufacturers are specified as a standard of quality and performance.
- B. The manufacture of the concrete structure shall be performed at a precast production facility certified by the National Precast Concrete Association (NPCA).
- C. The manufacturer of the **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** shall be licensed to produce and or sell the entire device or any components thereof by Terre Hill Concrete Products of Terre Hill Pennsylvania 717-445-3100.

PART 2- PRODUCTS

2.1 MATERIALS AND DESIGN

- A. The reinforced concrete vault structure shall be designed for HS-25 traffic loading, and existing soil pressure, ground water pressure and buoyancy. The materials and structural design shall be per ASTM C-478 and ASTM C-913. The concrete shall have a minimum compressive strength of 5000 psi.
- B. The access cover shall be designed for HS-25 traffic loading and shall provide a minimum of 27 1/2 inches clear opening. Manhole frame and cover shall be East Jordan or Quirin manufactured from gray iron conforming to ASTM A-48 Class 35B. The cover shall contain the words “Stormwater Treatment System” and the Terre Kleen™ logo as approved by Terre Hill Concrete Products.
- C. Butyl mastic sealant for joints shall conform to ASTM C-990.

- D. Pipe openings shall be sized to accept pipes of the specified sizes and shall be sealed with hydraulic cement conforming to ASTM C- 595M.
- E. The metal components shall be made of Aluminum Alloy 5052 (UNS # A95052) or equal.
- F. The hinge pins and connecting components shall be manufactured from stainless steel AISI Type 304L (UNS # S30403).
- G. All fasteners used in combination or connecting the separator to the concrete structure shall be made from stainless steel AISI 316 (UNS # 31600) and the threads shall be properly lubricated with Permatex anti-seize Item 80078 lubricant or equal. All surfaces of aluminum components that are to be embedded or in contact with fresh, unhydrated concrete shall be coated with Koppers Bitumastic 300M.
- H. Each **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)**, shall contain two (2) Ø 2 ¼" x 12" long sorbent booms with an absorption capacity of ¼ gallon per lineal foot shall be placed in the primary chamber for the absorption of gasoline; diesel fuel, lube oil, jet fuel, transformer oils, chlorinated solvents, aromatic solvents, hydraulic oils, light crude. The sorbent boom or Rubberizer® boom shall be manufactured by Haz-Mat Response Technologies Inc. or approved equal.

2.2 PERFORMANCE

- A. The inlet opening shall receive the storm water into the primary chamber. In the primary chamber, the separator shall facilitate the floatation of liquids and particles lighter than the density of water. Floatable solids, greater than 19mm [¾"], and liquids shall be retained in the primary chamber, and shall not be subject to loss through re-suspension or any other cause. Emulsified oils are not captured and are not part of the floatable mass.
- B. The heavy fraction of the solids shall settle in the bottom of the primary chamber.
- C. Particles kept in suspension in the primary chamber shall pass through a nutrient screen with a maximum screen opening of 16mm x 16mm [5/8"x 5/8"] and enter the grit chamber (sediment grit chamber).
- D. The design flow in M³/sec [GPM or CFS] for each **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** hydrodynamic separator water quality treatment device shall be as noted on the drawings.

PART 3-INSTALLATION

3.1 SEPARATOR FABRICATION

- A. Fabrication of the **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** hydrodynamic separator water quality device shall be in strict accordance with the design.
- B. The **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** hydrodynamic separator water quality device shall be provided with mounting brackets for installation

into the precast concrete structure with stainless steel mounting anchors.

- C. The nutrient screen shall be placed in the baffle wall.
- D. Certified welders experienced in the welding of specified thin metals shall place all welds.
- E. The fabricator shall remove shop soils, discoloration, and welding slag.

3.2 PRECAST CONCRETE STRUCTURE

- A. The utility contractor installing the precast concrete structure shall be responsible installing the structure so as to stop the infiltration or loss of water into or out of the precast concrete structure.
- B. The precast concrete structure shall be installed level and plumb at the specified elevation shown on the signed, approved plans, on a compacted stone sub base 150mm [6"] thick.
- C. Excavation and backfill shall be as specified in the signed, approved plans.

3.3 MANUFACTURER INSTALLATION TECHNICAL ASSISTANCE

- A. At the time and place of installation of any **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** the manufacturer, Terre Hill Concrete Products will provide a Product Liaison Person on site to offer technical assistance to the installation contractor to assure proper installation of the **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** in accordance with the signed, approved plans.

3.4 OPERATION AND MAINTENANCE

- A. The maintenance of the **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** is the responsibility of the Owner. Each site has unique site conditions. It is the responsibility of the Owner to establish a schedule according to the conditions of the specific site. Failure to clean the sediment from the **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** and to replace oil absorption booms will cause the **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** to not maintain its design performance capabilities. It is strongly recommended that the Owner follow the prescribe maintenance specifications and procedures published by Terre Hill Concrete Products and copy thereof given to the installation contractor for delivery to the Owner.(A copy of the Maintenance Procedures are attached hereto and made a part hereof.)

PART 4 Maintenance Procedures for Terre Kleen™

4.1 General

- A. Inspection and maintenance must be performed on a regular basis, All captured pollutants must be removed from the **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)**. During the first year after installation inspections should be performed

every three (3) months to determine the type and amount of pollutants in the **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)**. Site conditions and weather will influence the rate of pollutant capture. A schedule of regular maintenance can then be established based upon the quarterly inspections.

4.2 Pollutant Removal

A Access to both the primary and grit chambers is provided by manhole openings or inlet grates. Disposal of all of the removed pollutants should be properly documented in accordance with all applicable regulations. Removal may be done anytime after a rain event.

The **Terre Kleen™ Urban Protector (US Patent No. US 6,676,832 B2)** is designed for inspection and cleaning from grade.

Manhole covers and inlet grates must be put back securely to the frames after inspection or maintenance.

4.3 Documentation

A Proper documentation should include:

- a) dates and results of each inspection;
- b) proposed and installed repairs, renovations, improvements;
- c) type and amount of captured pollutants;
- d) disposal of pollutants;
- e) preparation and submittal of reports;
- f) document nutrient and sediment trading credits.